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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/632,582

Applicant(s)

GAVISH ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 11-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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The benefit claim filed on August 29, 2005 was not entered because the required reference was not timely filed within the time period set forth in 37 CFR 1.78(a)(2) or (a)(5). If the application is an application filed under 35 U.S.C. 111(a) on or after November 29, 2000, the reference to the prior application must be submitted during the pendency of the application and within the later of four months from the actual filing date of the application or sixteen months from the filing date of the prior application. If the application is a nonprovisional application which entered the national stage from an international application filed on or after November 29, 2000, after compliance with 35 U.S.C. 371, the reference to the prior application must be made during the pendency of the application and within the later of four months from the date on which the national stage commenced under 35 U.S.C. 371(b) or (f) or sixteen months from the filing date of the prior application. See 37 CFR 1.78(a)(2)(ii) and (a)(5)(ii). If applicant desires the benefit under 35 U.S.C. 120 based upon a previously filed application, applicant must file a petition for an unintentionally delayed benefit claim under 37 CFR 1.78(a)(3) or (a)(6). The petition must be accompanied by: (1) the reference required by 35 U.S.C. 120 or 119(e) and 37 CFR 1.78(a)(2) or (a)(5) to the prior application (unless previously submitted); (2) a surcharge under 37 CFR 1.17(t); and (3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(2) or (a)(5) and the date the claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional. The petition should be addressed to: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Claims 15-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The phrase "an angle of between 50 degrees and 60 degrees" was not contained in applicants' specification as originally filed.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 and 11-21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hongo I (5,026,664) taken in view of Hongo II (5,182,231) and Hamamura (5,342,448). Hongo I (see Figs. 1-3B) discloses a system comprising a chamber to house a substrate with an energy source coupled to it, and means for introducing an ion beam and a metal precursor gas into the chamber for forming a metal layer on a substrate in the chamber. Hongo I also teaches the use of an argon laser beam (which is a coherent electromagnetic radiation source) for annealing the FIB-CVD metal layer (see for example, col. 2, line 56 to col. 3, line 40, of Hongo I). Regarding the claim 1 limitation reference to removing gallium, it is noted that this is a recitation of intended use that the Hongo I laser is inherently capable of performing. For example, Hongo I teaches (col. 8, lines 29-32) the use of laser power of .2 to .5 watts, while applicants teach (paragraph 28 of the specification) the use of .3 to 5 watts. Therefore,

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Hongo's apparatus is inherently capable of providing the same heating effects as applicants' apparatus. Hongo I does not discuss the details of the computer control system used to control his apparatus. Hongo II and Hamamura have been cited, however, to illustrate the conventional nature of using a system controller and associated programmed computer memory to control an integrated apparatus of the type disclosed by Hongo I. Hongo I teaches (col. 8, lines 1-5) the use of conventional sequence control and numerical control to control the degree of exposure of his substrate to radiation from the laser beam. Hongo II is cited to show (see Fig. 20, for example) that the conventional sequence control and numerical control referred to by Hongo I includes the use of a computer which inherently incorporates instructions as claimed. Also, Hamamura (see Fig. 1, for example) teaches the desirability of using computer control of an ion beam, and it would have been obvious to use computer control of the FIB CVD apparatus of Hongo II. Also, while Hongo I does not mention what kind of ion beam he uses, Hongo II (col. 6, lines 6-15) does specifically teach the use of the conventional and well known gallium ion beam for his FIB-CVD apparatus, and it would have been obvious to one skilled in the art to use the Ga ion beam suggested by Hongo II as the ion beam in Hongo I. Regarding claim 5, it is noted that Hongo I teaches the use of a lens for his laser (see Fig. 2, element 17 and col. 4, lines 15-19), and the particular lens used is a results effective variable and a matter of obvious choice for one skilled in the art. It is noted also that the claimed references to particular line widths and spot sizes are method type limitations that do not so limit the present apparatus claims. The apparatus of Hongo I, Hongo II and Hamamura have an

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inherent or at least obvious capability of being so used. Regarding claim 12, it is noted that Hongo's system is used (see col. 8, lines 6-9) to introduce plural metal precursor gases through plural inlets. Regarding claim 9, see Hongo I at col. 8, lines 32-37.

Claims 12 and 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hongo I (5,026,664) taken in view of Hongo II (5,182,231) and Hamamura (5,342,448) for the reasons stated in the previous paragraph rejection, and taken in further view of Azuma (5,683,547). Azuma discloses an analogous apparatus to that of Hongo I, Hongo II and Hamamura in which an integrated processing apparatus is provided for integrating FIB processing with laser processing. Azuma further teaches the desirability of processing substrates in which the top surface of a layer to be processed forms an angle to the direction of the laser beam that is directed to said top surface. See, for example, figs. 25a-25f. It would have been obvious to one skilled in the art to integrate the functions of Azuma's integrated processing apparatus with the integrated processing apparatus of Hongo I, Hongo II and Hamamura, for the desirable purpose of providing a versatile integrated processing apparatus that is capable of performing all of the processing steps desired by Hongo I, Hongo II, Hamamura and Azuma.

Claims 16 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hongo I (5,026,664) taken in view of Hongo II (5,182,231), Hamamura (5,342,448) and Azuma (5,683,547) for the reasons stated in the previous paragraph, and taken in further view of Marsh (6,261,850). Claims 16 and 18-21 make reference to a width of a layer. First, it is noted that the width of a layer that could be deposited by an apparatus

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is in the nature of a method limitation and does not so limit the presently claimed apparatus. Regarding the question of what width of layer applicants' FIB CVD apparatus is inherently capable of forming, it is noted that applicants disclose (see paragraph 23 of applicants' specification) that their FIB is a commercially available model, which is the same model as used by Marsh (col. 9, lines 15-19). It would have been obvious to one skilled in the art to use the commercially available Ga FIB CVD source of Marsh as the Ga FIB CVD source suggested by Hongo II, because Marsh teaches that his source can successfully be used to practice a FIB CVD process. In such case the FIB would have been expected to be inherently capable of providing the line width referred to in claims 16 and 18-21.

Claims 1-9 and 11-21 stand rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gavish (6,638,580). The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131. Gavish (6,638,580) discloses a system including a chamber, energy source, ion beam source, system controller and memory coupled to the controller as presently claimed. The memory has a computer-readable program embodied therein for directing operation of the system, the program comprising instructions for controlling the energy source and for introducing at least one

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metal containing precursor into the focused ion beam to form at least one layer over the substrate.

Regarding the rejection of claim 1 over Hongo I in view of Hongo II and Hamamura, applicants have argued that “the cited references do not teach or suggest a system having a controller configured to control the introduction of a focused ion beam to form at least one metal layer over a substrate, and instructions for controlling a coherent electromagnetic radiation source applied to a top surface of the at least one layer to heat the at least one metal layer sufficiently to remove gallium from the layer, as required by claim 1”. Applicants have argued in effect that in Hongo I the laser is used to form a laser CVD layer on top of the FIB CVD layer, which is not the same as applicants’ invention because applicants use their laser treatment to anneal their FIB CVD layer, instead of forming an additional layer by laser CVD.

This argument is not convincing for the following reasons. The claim 1 limitation of “instructions for controlling a coherent electromagnetic radiation source applied to a top surface of the at least one layer to heat the at least one metal layer sufficiently to remove gallium from the layer” does not require a step of annealing to be performed, or for gallium to be removed from any layer. This quoted limitation merely specifies a particular amount of heating that the radiation source must be capable of being instructed to produce on the surface of substrate that was previously treated to form a layer by FIB CVD on the substrate. This limitation does not require that any gallium be removed from the layer, and it does not even require that any gallium be present in any layer. The apparatus disclosed by Hongo I is inherently capable of delivering the

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particular amount of heat required by this limitation to the surface of a substrate previously treated by FIB CVD. Hongo I teaches two different steps of using his laser to heat the substrate. In the first laser-heating step a laser CVD layer is formed, and in the second laser-heating step, the entire metal layer (including FIB CVD and laser CVD layers) is annealed. Hongo I clearly teaches (see for example, col. 7, lines 18-22) that the first laser-heating step (laser CVD) causes heating of the previously formed FIB CVD layer. Furthermore, Hongo I also clearly teaches (see for example col. 8, lines 18-36) that his laser is capable of and intended to be used for annealing the composite metal layer. For example, Hongo I teaches (col. 8, lines 29-32) the use of laser power of .2 to .5 watts/ μm^2 for his annealing step, while applicants teach (paragraph 28 of the specification) the use of .3 to 5 watts. Therefore, Hongo's apparatus is inherently capable of providing the same heating effects as applicants' apparatus. It is noted also that applicants' specification does not discuss specific ranges of heating amounts that are sufficient "to remove gallium from the layer", but paragraph 30 of the specification does give one example of such an amount. Paragraph 30 cites a laser power value 0.125 watt/ μm^2 combined with a stage speed of 50 μ /second as an example of conditions that can cause the removal of gallium. If the apparatus of Hongo I is inherently capable of providing instructions to use these parameters of laser power and stage speed, then Hongo's apparatus meets the recited limitations of apparatus claim 1. Regarding the stage speed, it is noted that Hongo I specifically suggests (see col. 8, lines 1-5) that the substrate holding stage should be controlled by a computer based controller that can be programmed beforehand. Also, if the stage speed were less than

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the 50 μ /second specified in applicants' paragraph 30, then it would be even more likely that gallium could be removed. For example, if Hongo's stage was instructed to be held stationary, while Hongo's laser of a power of .2 to .5 watts/ μm^2 were instructed to radiate onto the top surface of a substrate, then Hongo's apparatus would inherently be capable of causing at least the amount of heat as that described in paragraph 30 of applicants' specification, which applicants describe as an amount of heat that is sufficient to remove gallium. Regarding the step of holding the stage stationary during laser treatment, it is noted that Hongo describes this at col. 7, lines 37-68, so it is clear that Hongo's apparatus has this capability.

It is noted again that applicants' claim 1 does not require that gallium be removed from any layer. Claim 1 merely requires that the claimed apparatus be capable of heating the top surface of a substrate by a certain amount.

Regarding independent claims 15 and 18, applicants' arguments are analogous to those used for claim 1, and the same counter-arguments provided above apply to applicants' arguments with respect to claims 15 and 18. It is noted also that claims 15 and 18 contain new matter and are unpatentable for that reason also.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the


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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Richard Bueker
Primary Examiner
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